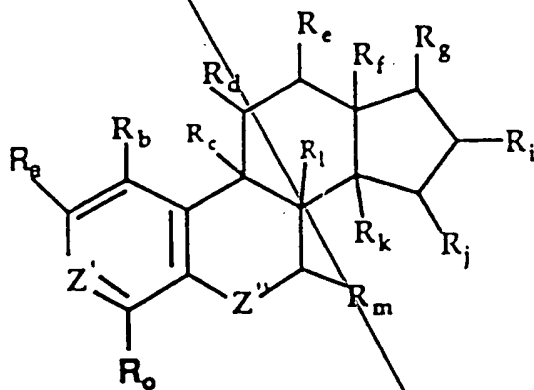


Claims

1. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_g, R_h, R_i, R_j, R_k, R_l, R_m, R_o, independently is -R₁, -OR₁,

12 $-\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br}, \text{ or } -\text{I};$ and R_g
 13 is $-\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br},$
 14 $-\text{I}, \text{ or } -\text{C}\equiv\text{CH};$

15 or

16 B) each $\text{R}_a, \text{R}_b, \text{R}_c, \text{R}_f, \text{R}_k, \text{R}_l, \text{R}_o,$
 17 independently is $-\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1,$
 18 $-\text{F}, -\text{NHR}_2, -\text{Br}, \text{ or } -\text{I};$ and each $\text{R}_d, \text{R}_e, \text{R}_i,$
 19 $\text{R}_j, \text{R}_m,$ independently is $=\text{O}, -\text{R}_1, -\text{OR}_1,$
 20 $-\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br}$ or $-\text{I};$ and R_g
 21 is $=\text{O}, -\text{R}_1, -\text{OR}_1, -\text{OCOR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2,$
 22 $-\text{Br}, -\text{I}, \text{ or } -\text{C}\equiv\text{CH};$

23 and

24 II. Z' is defined as follows:

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 26
 27 A) Z' is $\text{X},$ where X is $>\text{COR}_1, >\overset{\text{O}}{\underset{|}{\text{C}}}-\text{R}_1,$

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 29
 30 $>\overset{\text{O}}{\underset{|}{\text{C}}}-\text{OR}_1, >\overset{\text{OH}}{\underset{|}{\text{C}}}-\text{R}_1, >\overset{\text{OH}}{\underset{|}{\text{C}}}-\text{OR}_1;$

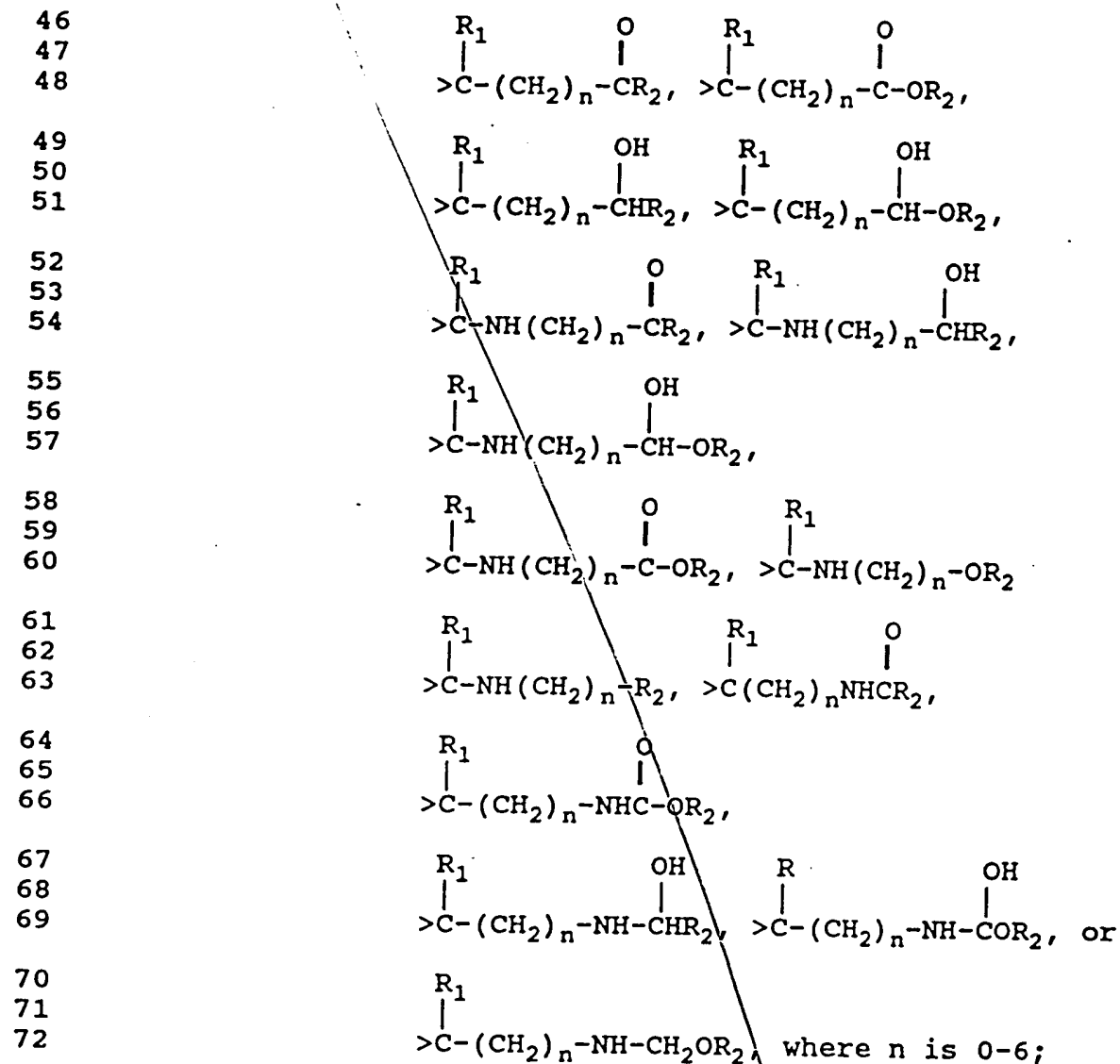
31 or

32 B) Z' is $=\text{C}-\text{X}'-$ or $-\text{X}'-\text{C}=,$ where R_n
 33 $\underset{|}{\text{R}_n} \quad \quad \quad \underset{|}{\text{R}_n}$
 34
 35 is $-\text{R}_1, -\text{OR}_1, -\text{SR}_1, -\text{F}, -\text{NHR}_2, -\text{Br}$ or $-\text{I};$
 36 and X' is $\text{X},$ as defined above; or X' is
 37 $>\text{C}=\text{O};$

38 and

39 III. Z'' is defined as follows:

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 41
 42 A) Z'' is $\text{Y},$ where Y is $-\text{O}-, -\overset{\text{R}_1}{\underset{|}{\text{N}}}-, >\text{CHR}_1,$
 43
 44 $>\text{C}=\text{O}, >\overset{\text{R}_1}{\underset{|}{\text{C}}}-(\text{CH}_2)_n\text{OR}_2,$
 45



73 or

74 B) Z" is -Y-CH- or -CH-Y- where R_p

75 $\begin{array}{c} R_p \\ | \\ -Y-CH- \end{array}$ or $\begin{array}{c} R_p \\ | \\ -CH-Y- \end{array}$

76 is -R₁, -OR₁, -SR₁, -F, -NHR₂, -Br or -I;

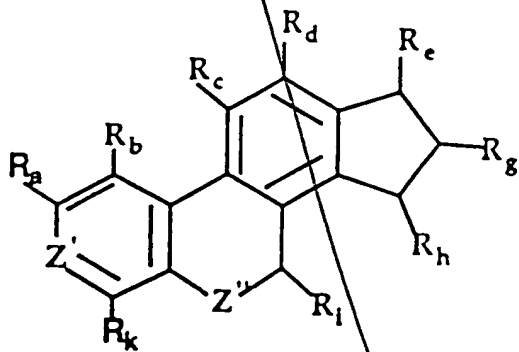
77 and

78 IV. provided that when each R_b, R_c, R_d, R_e, R_f, R_g, R_h,
79 R_i, R_m and R_o is H;
80 R_f is -CH₃;

82 R_g is -OH;
83 Z' is >COH; and
84 Z'' is >CH₂;
85 then R_a is not -H;
86 where, in each formula set forth above, each R_1 and R_2
87 independently is -H, or substituted or unsubstituted alkyl,
88 alkenyl or alkynyl group of 1-6 carbons.

1 2. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a-R_k are defined as follows:

10 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
 11 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 12 $-F, -NHR_2, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
 13 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

14 or

15 B) each R_a, R_b, R_c, R_d, R_k , independently is
 16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, \text{ or }$
 17 $-I$; and each R_e, R_h, R_i , independently is
 18 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or }$
 19 $-I$; and R_g is $=O, -R_1, -OR_1, -OCOR_1, -SR_1,$
 20 $-F, -Br, -I$ or $-C\equiv CH$;

21 and

22 II. Z' is defined as follows:

23
 24
 25 A) Z' is X , where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1,$

26
 27
 28 $>\overset{O}{\underset{|}{CC}}-OR_1, >\overset{OH}{\underset{|}{CC}}-R_1, >\overset{OH}{\underset{|}{C}}-C-OR_1;$

29 or

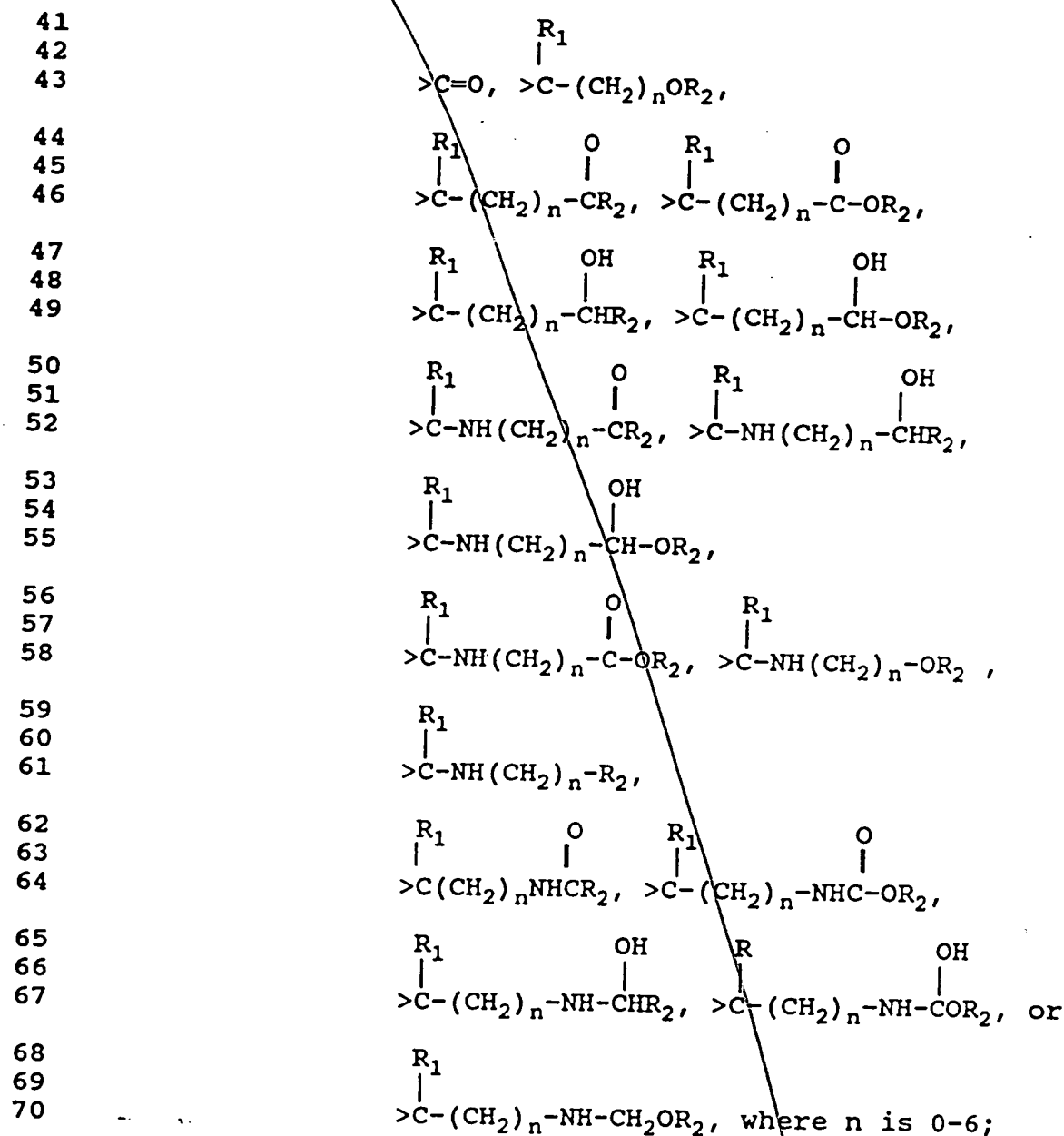
30 B) Z' is $=\underset{\underset{R_n}{|}}{C}-X'-$ or $-X'-\underset{\underset{R_n}{|}}{C}=$, where R_n
 31
 32

33 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$,
 34 and X' is X , as defined above;
 35 or X' is also $>C=O$;

36 and

37 III. Z'' is defined as follows:

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 39
 40 A) Z'' is Y , where Y is $-\overset{R_1}{\underset{|}{O}}-, -N-, >\underset{\underset{R_1}{|}}{CH}R_1,$



71 or

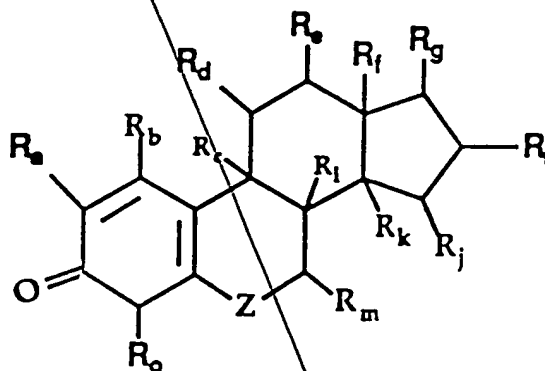
72 B) Z" is -Y-CH- or -CH-Y-, where R_p is
73
74

75 $\text{-R}_1, \text{-OR}_1, \text{-SR}_1, \text{-F, -NHR}_2, \text{-Br or -I;}$

76 where, in each formula set forth above, each R_1 and R_2
77 independently is -H, or substituted or unsubstituted alkyl,
78 alkenyl or alkynyl group of 1-6 carbons.

1 3. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a - R_o are defined as follows:

10 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_i , R_j , R_k , R_l ,
11 R_m , R_n independently is - R_1 , - OR_1 , - $OCOR_1$,
12 - SR_1 , -F, - NHR_2 , -Br, or -I; and R_o is - R_1 ,
13 - OR_1 , - $OCOR_1$, - SR_1 , -F, - NHR_2 , -Br, -I or
14 - $C\equiv CH$;

15 or

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23 and

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II. Z is defined as follows:

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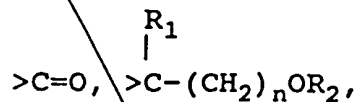
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A) Z is Y, where Y is $\overset{\text{R}_1}{\text{O}-}$, $\overset{\text{R}_1}{\text{N}-}$, $>\text{CHR}_1$,

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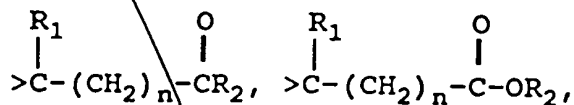
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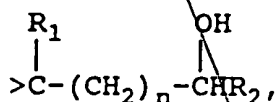
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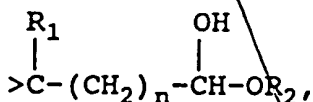
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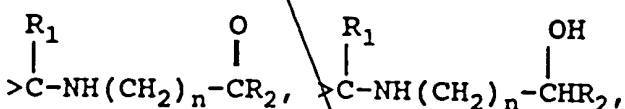
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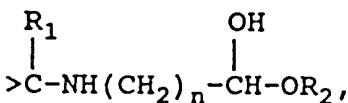
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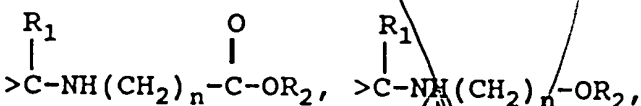
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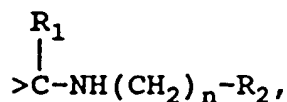
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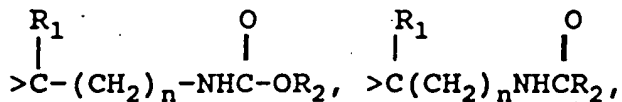
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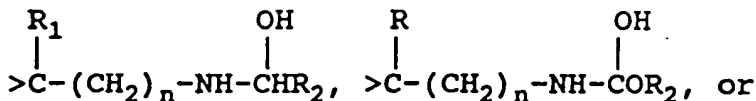
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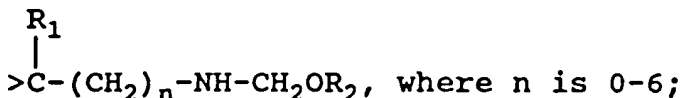
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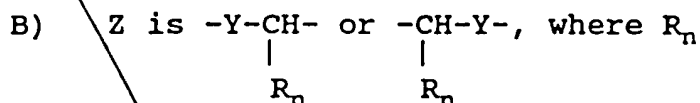


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62 or

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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

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where, in each formula set forth above, each R_1 and R_2

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independently is $-H$, or substituted or unsubstituted alkyl,

69

alkenyl or alkynyl group of 1-6 carbons.

1

4. A method for treating a mammalian disease

2

characterized by abnormal cell mitosis, said method

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comprising administering to a mammal a cell-mitosis-

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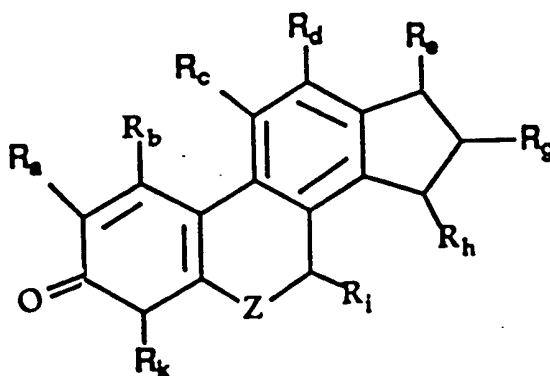
inhibiting compound of the formula below, said compound

5

being administered in an amount sufficient to inhibit cell

6

mitosis:



7 wherein:

8 I. R_a-R_k are defined as follows:

9 A) each $R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k$
 10 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 11 $-F, -NHR_1, -Br, \text{ or } -I$; and R_e is $-R_1, -OR_1,$
 12 $-OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

13 or

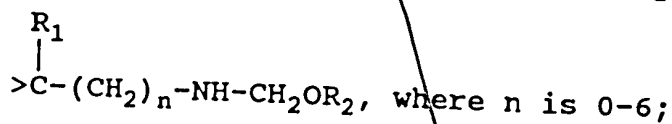
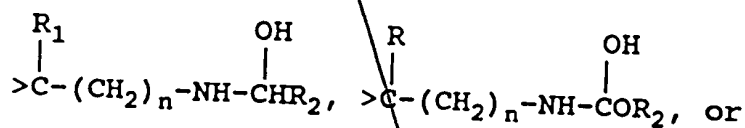
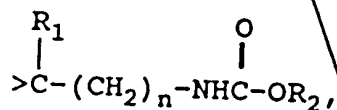
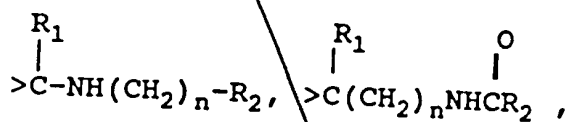
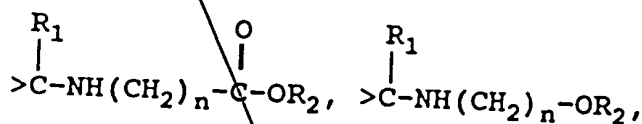
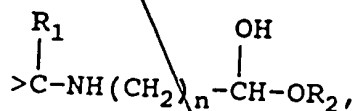
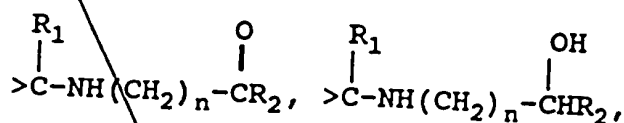
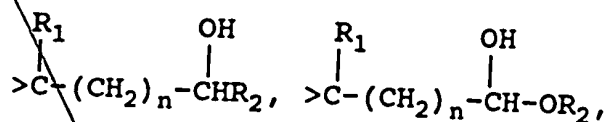
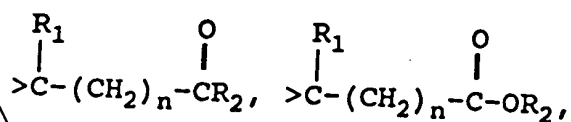
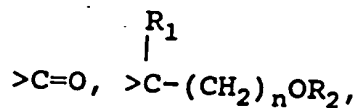
14 B) each R_a, R_b, R_c, R_d , independently is $-R_1,$
 15 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, \text{ or } -I$
 16 and each R_g, R_h, R_i, R_k independently is
 17 $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$
 18 or $-I$; and R_e is $=O, -R_1, -OR_1, -OCOR_1,$
 19 $-SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

20 and

21 II. Z is defined as follows:

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A) Z is Y, where Y is $-O-$, $-N-$, $>CHR_1$,

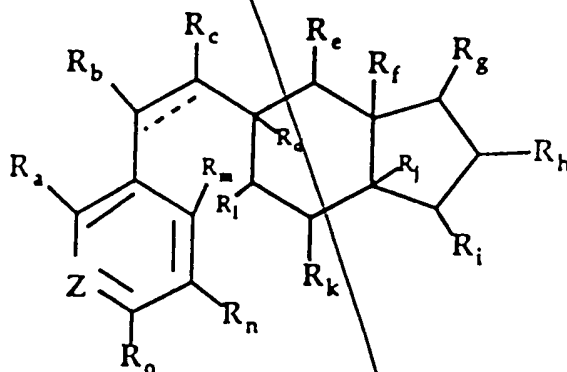


B) Z is $-Y-CH-$ or $-CH-Y-$, where R_n

$$R_n \quad R_n$$

59 is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;
60 where, in each formula set forth above, each R_1 and R_2
61 independently is $-H$, or substituted or unsubstituted alkyl,
62 alkenyl or alkynyl group of 1-6 carbons.

1 5. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:
7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
11 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
13 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
14 $-I$ or $-C\equiv CH$;

15 or

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23 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and each $R_b, R_c, R_e, R_g, R_h, R_k, R_l$ independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br \text{ or } -I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, -I \text{ or } -C\equiv CH$;

31 II. Z is defined as follows:

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or

A) Z is X, where X is $>COR_1, \overset{O}{\underset{|}{>CC-R_1}}, \overset{O}{\underset{|}{>CC-OR_1}}, \overset{OH}{\underset{|}{>CC-R_1}}, \overset{OH}{\underset{|}{>CC-OR}}$;

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B) Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$, where R_p

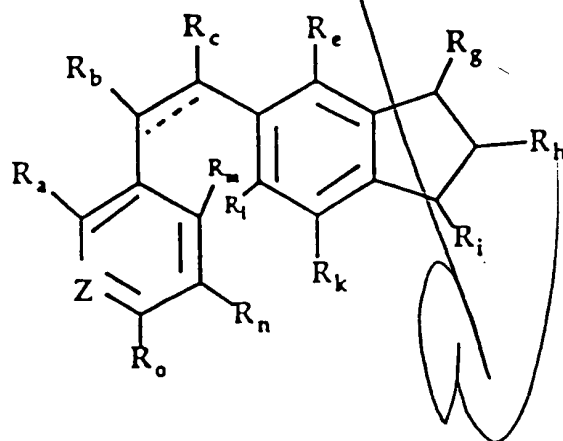
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is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
and X' is X , as defined above;
or X' is $>\text{C}=\text{O}$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $\text{C}\bullet\bullet\bullet\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
49 bond, is the unit $\text{HC}=\text{CH}$.

1 6. A method for treating a mammalian disease
2 characterized by abnormal cell mitosis, said method
3 comprising administering to a mammal a cell-mitosis-
4 inhibiting compound of the formula below, said compound
5 being administered in an amount sufficient to inhibit cell
6 mitosis:

7



8 wherein:

9 I. R_a-R_o are defined as follows:

10 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
 11 R_o independently is $-R_1, -OR_1, -OCOR_1,$
 12 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_i is $-R_1,$
 13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 14 $-C\equiv CH$;

15 or

16 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
 17 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 18 $-I$ and each R_b, R_c, R_g, R_h is $=O, -R_1,$
 19 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
 20 and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 21 $-NHR_1, -Br, -I$ or $-C\equiv CH$;

22 or

23 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
 24 independently is $-R_1, -OR_1, -OCOR_1, -SR_1,$
 25 $-F, -NHR_2, -Br, -I,$ and each R_h, R_l
 26 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 27 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O,$
 28 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
 29 or $-C\equiv CH$;

30 and

31 I. Z is defined as follows:

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 33
 34 A) Z is X, where X is $\begin{array}{c} O \\ | \\ >COR_1, >CC-R_1, >CC-OR_1, \\ \\ OH \quad OH \\ | \quad | \\ >CC-R_1, >CC-OR; \end{array}$

38 or

39
40
41

B) Z is $\begin{array}{c} \text{C}-\text{X}'- \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} -\text{X}'-\text{C}= \\ | \\ \text{R}_p \end{array}$, where R_p

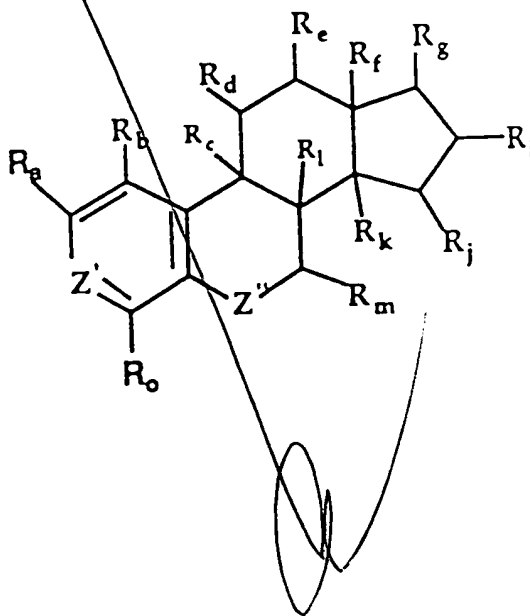
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is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$,
and X' is X , as defined above;
or X' is $=\text{O}$;

45 where, in each formula set forth above, each R_1 and R_2
46 independently is $-\text{H}$, or substituted or unsubstituted alkyl,
47 alkenyl or alkynyl group of 1-6 carbons; and the bond
48 indicated by $\text{C}\cdots\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
49 bond is the unit $\text{HC}=\text{CH}$.

1
2
3

7. A compound of the general formula below, said
compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

6 (A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
7 R_m, R_o , independently is $-R_1, -OR_1,$
8 $-OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$; and R_g
9 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
10 $-I$ or $-C\equiv CH$;

11 or

12 (B) each $R_a, R_b, R_c, R_f, R_k, R_l, R_o$, is $-R_1,$
13 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br$, or $-I$;
14 and each R_d, R_e, R_i, R_j, R_m , independently
15 is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2,$
16 $-Br$ or $-I$; and R_g is $=O, -R_1, -OR_1, -OCOR_1,$
17 $-SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;

18 and

19 II. Z' is defined as follows:

20
21
22 A) Z' is X , where X is $\overset{O}{\underset{|}{>COR_1}}, \overset{O}{\underset{|}{>CC-R_1}},$

23
24
25 $\overset{O}{\underset{|}{>CC-OR_1}}, \overset{OH}{\underset{|}{>CC-R_1}}, \overset{OH}{\underset{|}{>CC-OR_1}};$

26 or

27 B) Z' is $\underset{R_n}{\underset{|}{=C-X'}} -$ or $-X' - \underset{R_n}{\underset{|}{C=}}$, where R_n

28
29
30 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;
31 or X' is X , as defined above; or
32 X' is $>C=O$;

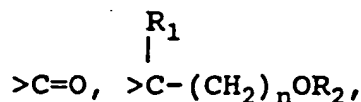
33 and

34 III. Z'' is defined as follows:

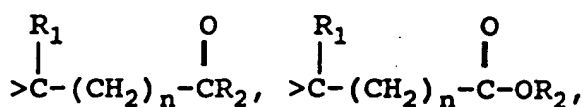
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A) Z" is Y, where Y is $\begin{array}{c} R_1 \\ | \\ -O-, -N-, >CHR_1, \end{array}$

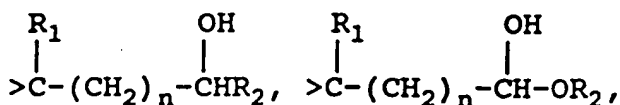
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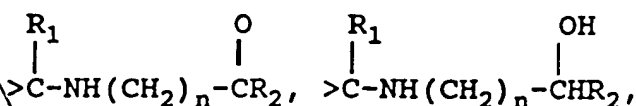
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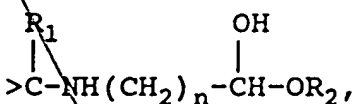
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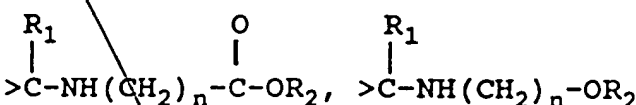
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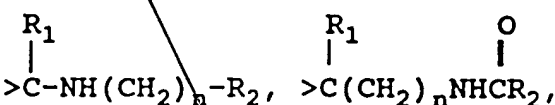
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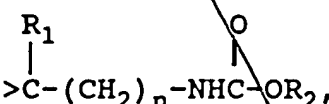
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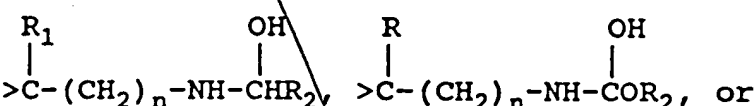
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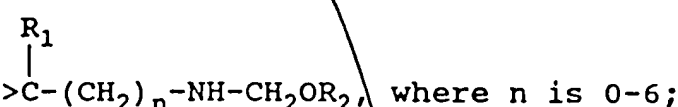
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68 or

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B) Z" is $\begin{array}{c} | \\ -Y-CH- \text{ or } -CH-Y- \\ | \quad \quad | \\ R_p \quad R_p \end{array}$ where R_p

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72 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I$;

73 provided that when:

74 3) each $R_b, R_c, R_d, R_e, R_j, R_k, R_l, R_m$ is $-H$;
75 R_f is $-CH_3$;

76 R_g is $-OH, -OCCH_3$;
77 R_i is $-H, -OH$, or $=O$;
78 R_o is $-H$ or $-Br$;

79 Z' is $>COH$; and

80 Z'' is $>CH_2$ or $-OH$; then

81 R_a is not $-F, -Br, -OH$ or $-H$;

82 and

83 4) each $R_b, R_c, R_d, R_e, R_i, R_j, R_k, R_l$,

84 R_m is $-H$;

85 R_f is $-CH_3$;

86 R_g is $-OH$; and

87 Z'' is $>CH_2$; then

88 Z' is not $>COCH_3$ or $>COCCH_3$; and

89 each R_a, R_o independently or together are

90 not $-OCH_3$ or $-H$;

91 and

92 5) each $R_c, R_e, R_j, R_k, R_l, R_m, R_o$ is $-H$;

93 R_a is $-H$ or $-OCH_3$;

94 R_b is $-H$ or $-CH_3$;

95 R_d is $-OH$;

96 R_f is $-CH_3$;

97 R_g is $=O$;

98 R_i is $-OH, =O$ or $-C\equiv CH$; and

99 Z'' is $>CH_2$; then

100 Z' is not $>COH, >COCCH_3$, or $-H$;

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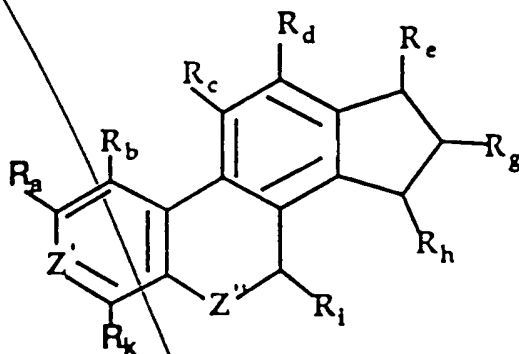
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107 where, in each formula set forth above, each R_1 and R_2
108 independently is -H, or substituted or unsubstituted alkyl,
109 alkenyl or alkynyl group of 1-6 carbons.

1 8. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_2$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

11 B) each R_a , R_b , R_c , R_d , R_k is $-R_1$, $-OR_1$,
12 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and
13 each R_g , R_h , R_i , independently is $=O$,

14 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -Br, \text{ or } -I;$
 15 and R_e is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
 16 $-Br, -I$ or $-C\equiv CH;$

17 and

18 I. Z' is defined as follows:

19
 20
 21 A) Z' is X , where X is $>COR_1, >C_2\overset{O}{\underset{|}{C}}-R_1,$

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 23
 24 $>C_2\overset{O}{\underset{|}{C}}-OR_1, >CC\overset{OH}{\underset{|}{C}}-R_1, >C\overset{OH}{\underset{|}{C}}-OR_1;$

25 or

26 B) Z' is $=C\overset{R_n}{\underset{|}{X'}}-$ or $-X'\overset{R_n}{\underset{|}{C}}=$, where R_n
 27
 28
 29 is $-R_1, -OR_1, -SR_1, -F, -NHR_2, -Br$ or $-I,$
 30 and X' is X , as defined above;
 31 or X' is also $>C=O;$

32 and

33 II. Z'' is defined as follows:

34
 35
 36 A) Z'' is Y , where Y is $-O-, -N\overset{R_1}{\underset{|}{-}}, >CH\overset{R_1}{\underset{|}{R_1}},$

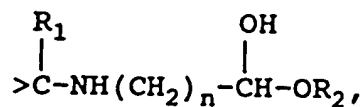
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 38
 39 $>C=O, >C\overset{R_1}{\underset{|}{(CH_2)_n}}OR_2,$

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 41
 42 $>C\overset{R_1}{\underset{|}{(CH_2)_n}}-CR_2, >C\overset{R_1}{\underset{|}{(CH_2)_n}}-\overset{O}{\underset{|}{C}}-OR_2,$

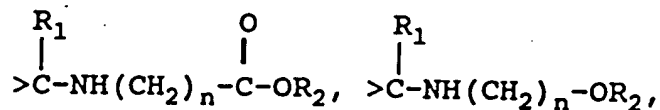
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 45 $>C\overset{R_1}{\underset{|}{(CH_2)_n}}-\overset{OH}{\underset{|}{CH}}R_2, >C\overset{R_1}{\underset{|}{(CH_2)_n}}-\overset{OH}{\underset{|}{CH}}-OR_2,$

46
 47
 48 $>C\overset{R_1}{\underset{|}{NH}}(CH_2)_n-CR_2, >C\overset{R_1}{\underset{|}{NH}}(CH_2)_n-\overset{OH}{\underset{|}{CH}}R_2,$

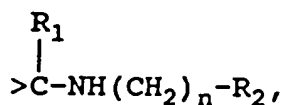
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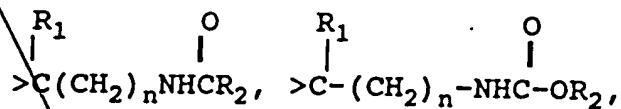
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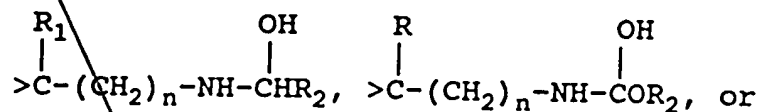
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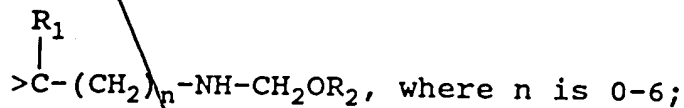
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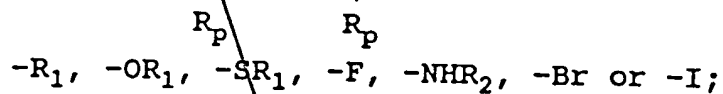


67 or

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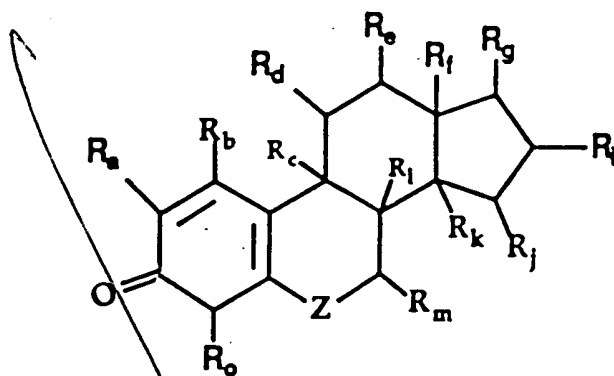
B) Z" is -Y-CH- or -CH-Y-, where R_p is

71
72



72 where, in each formula set forth above, each R₁ and R₂
73 independently is -H, or substituted or unsubstituted alkyl,
74 alkenyl or alkynyl group of 1-6 carbons.

1 9. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:



3 wherein:

4 I. R_a-R_o are defined as follows:

5 A) each $R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l,$
 6 R_m, R_o independently is $-R_1, -OR_1, -OCOR_1,$
 7 $-SR_1, -F, -NHR_2, -Br, \text{ or } -I$; and R_g is $-R_1,$
 8 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or
 9 $-C\equiv CH$;

10 or

11 B) each $R_a, R_b, R_c, R_f, R_k, R_l$, independently
 12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
 13 or $-I$; and each $R_d, R_e, R_i, R_j, R_m, R_o$
 14 independently is $=O, -R_1, -OR_1, -OCOR_1,$
 15 $-SR_1, -F, -NHR_2, -Br, -I$; and R_g is $=O,$
 16 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$
 17 or $-C\equiv CH$;

18 and

19 II. Z is defined as follows:

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22

A) Z is Y , where Y is $-O-, \overset{R_1}{|} -N-, >CHR_1,$

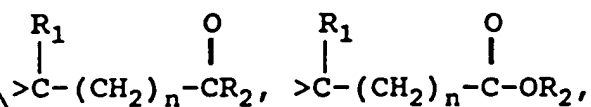
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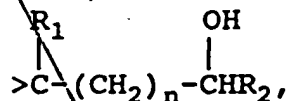
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$\overset{R_1}{|} >C=O, >C-(CH_2)_nOR_2,$

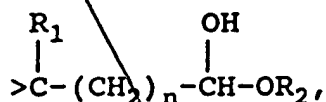
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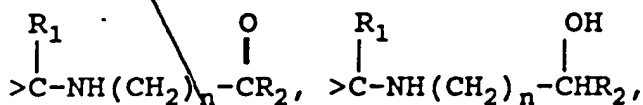
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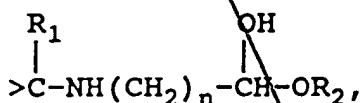
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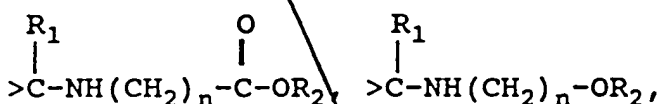
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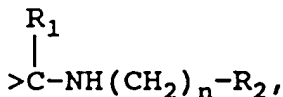
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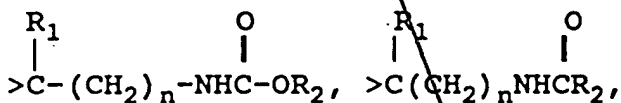
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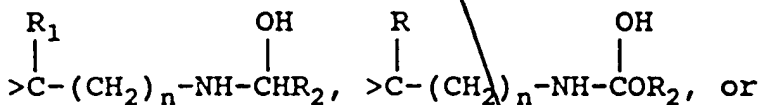
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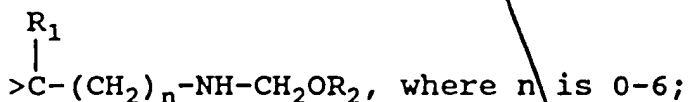
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57 or

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B) Z is $\begin{array}{c} -Y-CH- \\ | \\ R_n \end{array}$ or $\begin{array}{c} -CH-Y- \\ | \\ R_n \end{array}$, where R_n

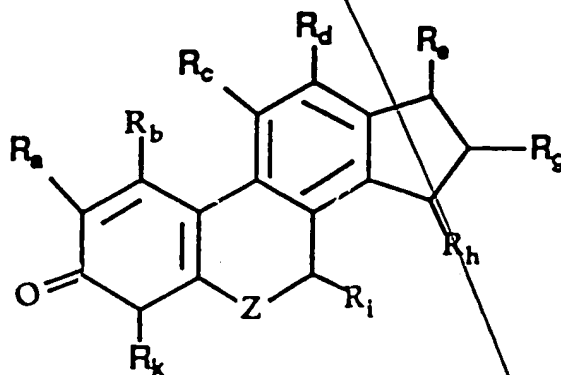
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

62 where, in each formula set forth above, each R_1 and R_2
63 independently is -H, or substituted or unsubstituted alkyl,
64 alkenyl or alkynyl group of 1-6 carbons.

1 10. A compound of the general formula below, said
2 compound being a cell-mitosis-inhibiting compound:

3



4 wherein:

5 I. R_a - R_k are defined as follows:

6 A) each R_a , R_b , R_c , R_d , R_g , R_h , R_i , R_k
7 independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
8 $-F$, $-NHR_1$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$,
9 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

10 or

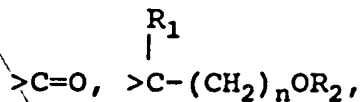
11 B) each R_a , R_b , R_c , R_d , independently is $-R_1$,
12 $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, or $-I$;
13 and each R_g , R_h , R_i , R_k independently is
14 $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$
15 or $-I$; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$,
16 $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

17 II. Z is defined as follows:

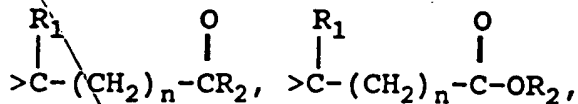
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1) Z is Y, where Y is $\overset{\text{R}_1}{\text{O}}$ -, $\overset{\text{R}_1}{\text{N}}$ -, >CHR_1 ,

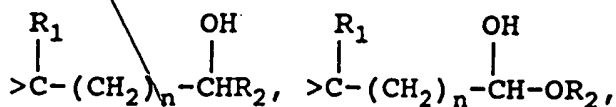
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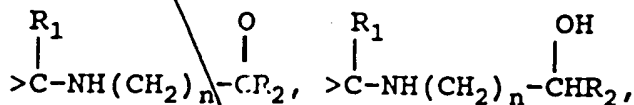
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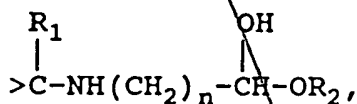
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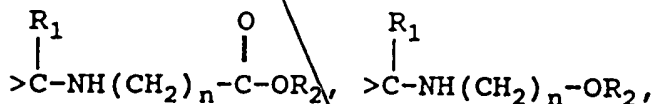
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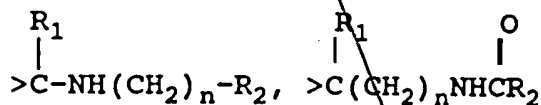
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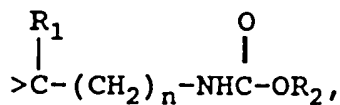
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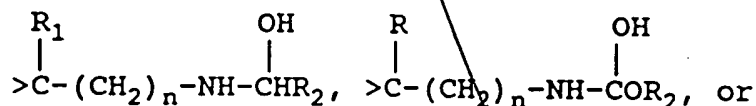
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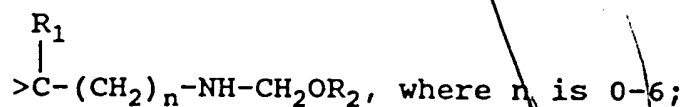
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51 or

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Z is $-Y-CH-$ or $-CH-Y-$, where R_n
 $\begin{array}{c} | \\ R_n \end{array}$ $\begin{array}{c} | \\ R_n \end{array}$

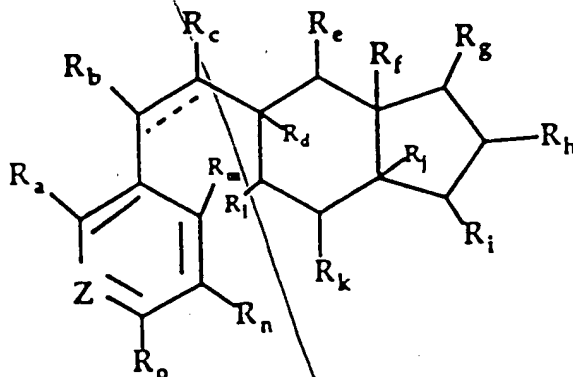
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is $-R_1$, $-OR_1$, $-SR_1$, $-F$,
 $-NHR_2$, $-Br$ or $-I$;

57 where, in each formula set forth above, each R_1 and R_2
 58 independently is $-H$, or substituted or unsubstituted alkyl,
 59 alkenyl or alkynyl group of 1-6 carbons.

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11. A compound of the general formula below, said
 compound being a cell-mitosis-inhibiting compound:



4 wherein:

5 I. R_a-R_o are defined as follows:

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10

A) each R_a , R_b , R_c , R_d , R_e , R_f , R_g , R_h , R_j , R_k ,
 R_l , R_m , R_n , R_o independently is $-R_1$, $-OR_1$,
 $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i
 is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$,
 $-I$ or $-C\equiv CH$;

11 or

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19 or

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B) each $R_a, R_d, R_f, R_j, R_m, R_n, R_o$ independently is $-R_1, -OR_1, -OCR_1, -SR_1, -F, -NHR_2, -Br, -I$; and each $R_b, R_c, R_e, R_g, R_h, R_k, R_l$ independently is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$; and R_i is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$ or $-C\equiv CH$;

27 and

28 I. Z is defined as follows:

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31

1) Z is X, where X is $>COR_1, >\overset{O}{\underset{|}{CC}}-R_1, >\overset{O}{\underset{|}{CC}}-OR_1,$

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$\overset{OH}{\underset{|}{>CC}}-R_1, \overset{OH}{\underset{|}{>CC}}-OR_1$; or

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Z is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$, where R_p

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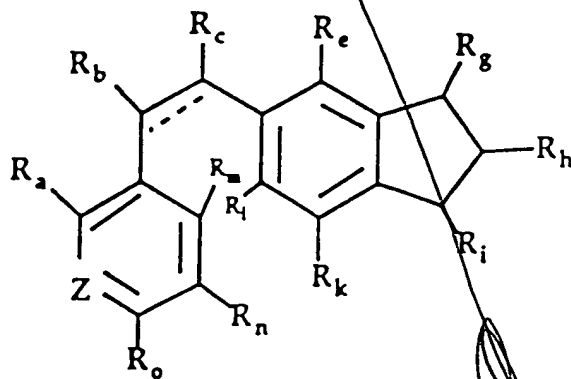
is $-\text{R}_1$, $-\text{OR}_1$, $-\text{SR}_1$, $-\text{F}$, $-\text{NHR}_2$, $-\text{Br}$ or $-\text{I}$;
and X' is X , as defined above;
or X' is $>\text{C}=\text{O}$;

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42
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where, in each formula set forth above, each R_1 and R_2
independently is $-\text{H}$, or substituted or unsubstituted alkyl,
alkenyl or alkynyl group of 1-6 carbons; and the bond
indicated by $\text{C}\cdots\text{C}$ is absent or, in combination with the $\text{C}-\text{C}$
bond is the unit $\text{HC}=\text{CH}$.

1
2
3

12. A compound of the general formula below, said
compound being a cell-mitosis-inhibiting compound:



4 wherein:

- 5 I. R_a-R_o are defined as follows:
- 6 A) each $R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n,$
7 R_o independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
8 $-F, -NHR_2, -Br, \text{ or } -I$; and R_l is $-R_1, -OR_1,$
9 $-OCOR_1, -SR_1, -F, -NHR_2, -Br, -I$ or $-C\equiv CH$;
- 10 or
- 11 B) each $R_a, R_e, R_l, R_m, R_n, R_o$ independently
12 is $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_2, -Br,$
13 $-I$; and each R_b, R_c, R_g, R_h is $=O, -R_1,$
14 $-OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br$ or $-I$;
15 and R_l is $=O, -R_1, -OR_1, -OCOR_1, -SR_1, -F,$
16 $-NHR_1, -Br, -I$ or $-C\equiv CH$;
- 17 or
- 18 C) each $R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o$
19 independently is $-R_1, -OR_1, OCOR_1, -SR_1,$
20 $-F, -NHR_2, -Br, -I$; and each R_g, R_h
21 independently is $=O, -R_1, -OR_1, -OCOR_1,$
22 $-SR_1, -F, -NHR_1, -Br$ or $-I$; and R_l is $=O,$
23 $-R_1, -OR_1, -OCOR_1, -SR_1, -F, -NHR_1, -Br, -I$
24 or $-C\equiv CH$;
- 25 and
- 26 II. Z is defined as follows:
- 27
- 28
- 29 A) Z is X , where X is $>C(=O)R_1, >C(=O)CC-R_1, >C(=O)CC-OR_1,$
30 $>C(OH)(R_p)CC-R_1, >C(OH)(R_p)CC-OR;$
31
32
- 33 or
- 34 B) Z is $=C(X')R_p$ or $-X'-C(=R_p),$ where R_p
35
36

37 is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$,
 38 and X' is X , as defined above;
 39 or X' is $=O$;
 40 where, in each formula set forth above, each R_1 and R_2
 41 independently is $-H$, or substituted or unsubstituted alkyl,
 42 alkenyl or alkynyl group of 1-6 carbons; and the bond
 43 indicated by $C \bullet \bullet \bullet C$ is absent or, in combination with the $C-C$
 44 bond is the unit $HC=CH$.

1 13. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-methoxyestradiol.

1 14. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-fluoroestradiol.

1 15. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-bromoestradiol.

1 16. The method of claim 1, wherein said
 2 cell-mitosis-inhibiting composition is 2-methoxyestrone.

1 17. The method of claim 1, wherein said cell-
 2 mitosis-inhibiting composition is 17-ethynylestradiol.

1 18. The method of claims 1 or 2 wherein said
 2 compound is further characterized in that

3 A) Z' is $\begin{array}{c} =C-X'- \\ | \\ R_n \end{array}$ or $\begin{array}{c} -X'-C= \\ | \\ R_n \end{array}$; and
 4
 5

6 Z'' is $\begin{array}{c} -Y-CH- \\ | \\ R_p \end{array}$ or $\begin{array}{c} -CH-Y- \\ | \\ R_p \end{array}$; or
 7
 8

9 B) Z' is X ; and Z'' is $\begin{array}{c} -Y-CH- \\ | \\ R_p \end{array}$ or $\begin{array}{c} -CH-Y- \\ | \\ R_p \end{array}$; or
 10
 11

12 C) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.
13
14

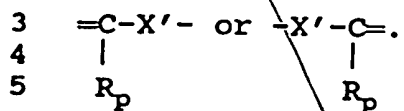
1 19. The method of claims 3 or 4 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 20. The method of claims 5 or 6 wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_p \end{array}$.
4
5

1 21. The compound of claims 7 or 8, wherein said
2 compound is further characterized in that
3 A) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and
4
5 Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
6
7
8 B) Z' is X; and Z" is $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_p \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_p \end{array}$; or
9
10
11 C) Z' is $\begin{array}{c} \text{=C-X'-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-X'-C=} \\ | \\ \text{R}_n \end{array}$; and Z" is Y.
12
13
14

1 22. The compound of claims 9 or 10, wherein said
2 compound is further characterized in that Z is
3 $\begin{array}{c} \text{-Y-CH-} \\ | \\ \text{R}_n \end{array}$ or $\begin{array}{c} \text{-CH-Y-} \\ | \\ \text{R}_n \end{array}$.
4
5

1 23. The compound of claims 11 or 12, wherein said
2 compound is further characterized in that Z is



1 24. The method of any one of claims 1-6, wherein at
2 least one of $R_a \rightarrow R_p$ is $-OCH_3$.

1 25. The compound of any one of claims 7-12, wherein
2 at least one of $R_a \rightarrow R_p$ is $-OCH_3$.

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